Photography: DWR

California's Drought Update

May 28, 2010

State of California
Governor
Arnold Schwarzenegger

The Natural Resources Agency
Secretary for Resources
Lester A. Snow

Department of Water Resources
Director
Mark Cowin

California's Drought Update

Photography: DWR

Drought Operations Center
Phone: (888) 5-DROUGHT
(888) 537-6844)
E-mail: drought@water.ca.gov

Drought website:
http://www.water.ca.gov/drought/

Introduction

This drought bulletin provides a monthly update to California's water conditions. In the spring when seasonal precipitation typically declines statewide after March, there is increased interest in reservoir storage conditions and runoff forecasts to assess available water supplies. In April however, the snowpack increased, significantly improving the water supply outlook. The total statewide October through April precipitation was 105 percent of average.

Information in the update is based on hydrologic data compiled through the end of April 2010, with more current information provided for selected reservoirs and indices. This month's report includes: updated information on hydrologic and water supply conditions; comparisons to historical drought conditions; water supply allocations; and local drought impacts by hydrologic region. Additional drought information can be found on the drought website (http://www.water.ca.gov/drought/).

Hydrologic and Water Supply Conditions

Precipitation

The 2009 Water Year (October 1, 2008 through September 30, 2009) was the third consecutive year of below average precipitation for the state. Annual statewide precipitation totaled 76 percent, 72 percent, and 63 percent of average for Water Years 2009, 2008, and 2007, respectively.

Table 1 compares the average monthly contribution to statewide precipitation to the observed precipitation from Water Years 2009 and 2010 (to date). In Water Year 2009, January, April, July, August, and September were exceptionally dry while February, May, and June, were well above average. Water Year 2009 finished at 76 percent of an average water year. Water Year 2010 through April stands at 105 percent of average. In Water Year 2010, November was exceptionally dry while October, January, and April were well above average.

Month of Water Year	Avg CA Precip (inches)	WY 2009 Observed	% of Average	WY2010 Observed	WY 2010 % of Avg
October	1.22	0.73	60%	2.16	177%
November	2.80	2.49	89%	0.79	28%
December	3.91	3.05	78%	3.43	87%
January	4.35	1.26	29%	6.75	155%
February	3.66	5.06	138%	3.66	99%
March	3.12	2.13	68%	1.92	61%
April	1.64	0.59	36%	3.21	196%
May	0.89	1.47	165%		
June	0.35	0.46	133%		
July	0.18	0.02	11%		
August	0.28	0.06	20%		
September	0.48	0.09	19%		
Total	**22.88**	**17.40**	**76%**	**21.93**	**105%**

Table 1. Average statewide precipitation by month with statewide precipitation values from Water Years 2009 and 2010. Data from California Climate Tracker (Western Region Climate Center): http://www.wrcc.dri.edu/monitor/cal-mon/frames_version.html

Current equatorial sea surface temperature data indicates El Niño/La Niña neutral conditions void of any temperature anomalies. A transition to El Niño/La Niña neutral conditions is expected by June 2010 which will continue into the Northern Hemisphere summer 2010 based on the May 17 update by NOAA's Climate Prediction Center (CPC). Although many models are predicting El Niño/La Niña neutral conditions, there is a growing possibility of La Niña developing during the second half of 2010. The CPC's May 20 1-month outlook for June suggests increased chances of above normal temperatures for the entire eastern half of California. The 1-month precipitation outlook issued the same day suggests equal chances of above or below normal precipitation for all of California. The CPC's May 20 90-day outlook suggests a similar trend for both temperature and precipitation as the 1-month outlook.

The Northern Sierra 8-Station and San Joaquin 5-Station Precipitation Indices track the wetness of the Sacramento and San Joaquin River basins. These indices help correlate the health of the runoff into Central Valley reservoirs. In general, April and May have been wet and cool, due to a series of cold, late-winter storms that brought significant precipitation to the state. As of May 24, the 8-Station Index is at 107 percent of average to date with the 5-Station Index fairing slightly better at 114 percent of average to date. Note the precipitation for the 8-Station and 5-Station indices are both above the average annual precipitation. The annual average for the 8-Station Index is 50 inches and the 5-Station Index is 40.8 inches. Figures 1 and 2 show the current indices values compared to other Water Years.

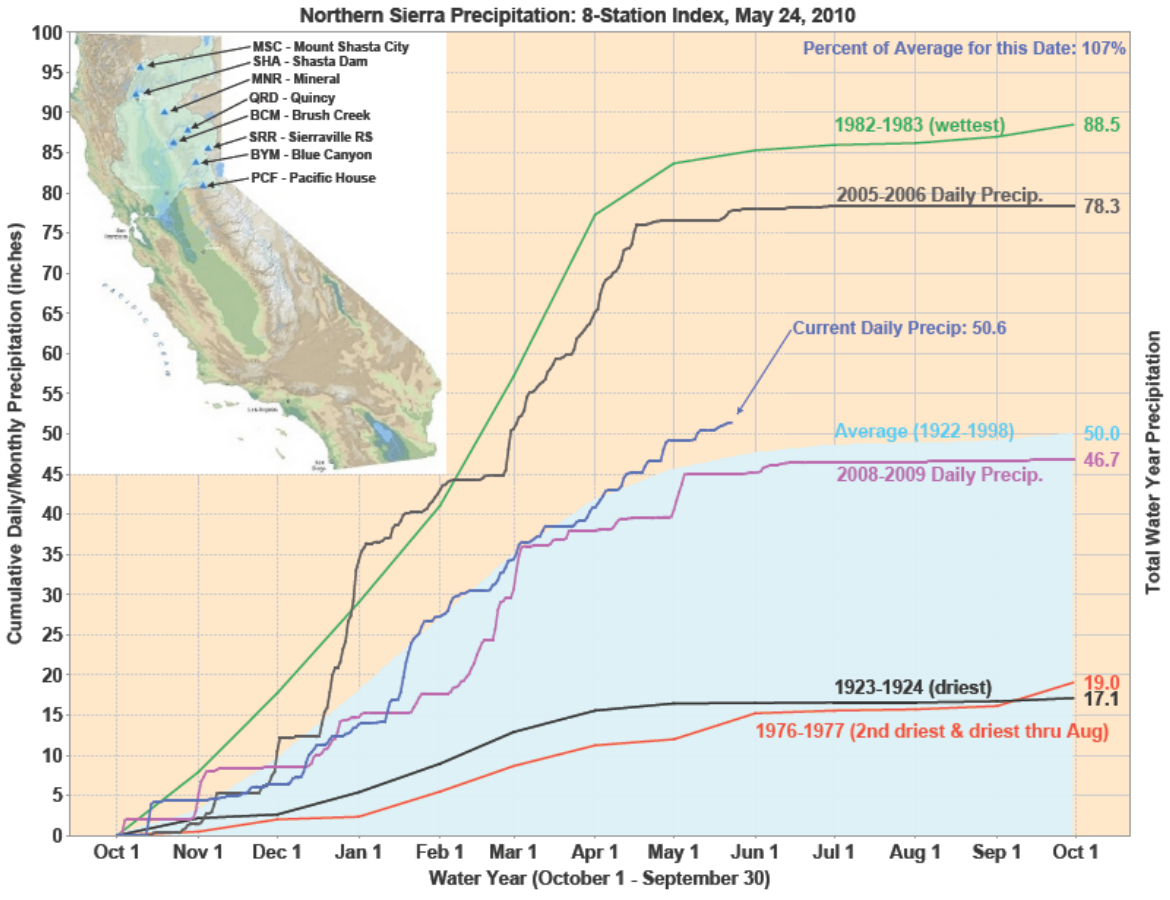

Figure 1. Northern Sierra 8-Station Precipitation Index

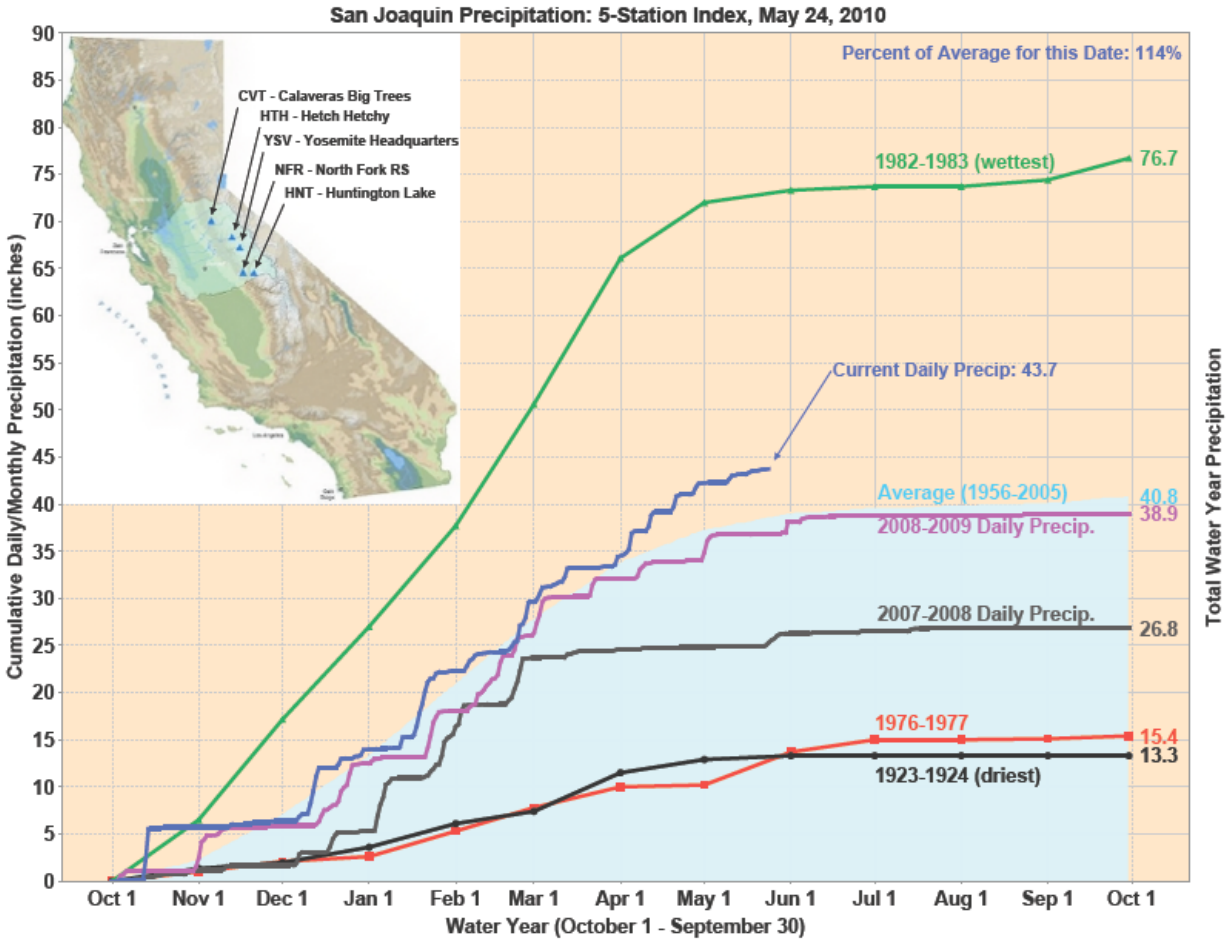

Figure 2. San Joaquin 5-Station Precipitation Index

Snowpack

As of May 24, 2010 the statewide snowpack stands at 21.0 inches, which is 172 percent of average to date and 74 percent of the average April 1 snowpack (typical date of maximum snow accumulation). For the 2010 water year, the snowpack peaked on April 15 at 33 inches, which was 118 percent of the April 1 average. During Water Year 2009, the snowpack peaked on March 25, 2009 at 25 inches, which was 88 percent of the average April 1 snowpack.

Reservoir Storage

Statewide reservoir storage at the end of Water Year 2009 was over 17 MAF or about 80 percent of average and 46 percent of capacity for the date, with individual key reservoirs much lower. Statewide reservoir storage on May 17, 2010 was 19.4 MAF which is about 96 percent of average and 76 percent of capacity. Figure 3 shows the condition of the state's larger reservoirs as of midnight on May 23, 2010.

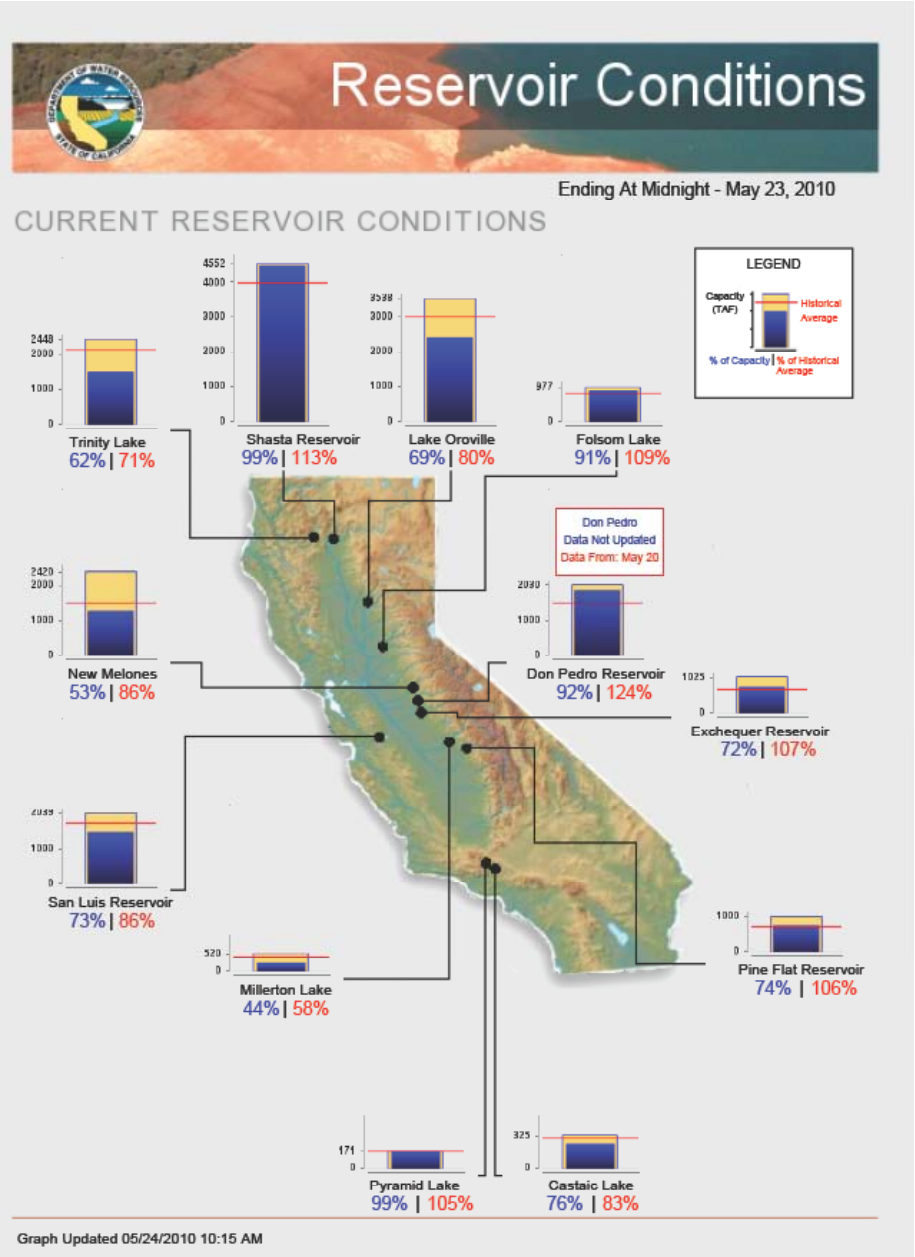

Figure 3. Reservoir storage for select reservoirs shown as percent of capacity (blue) and percent of average (red).

Source:http://cdec.water.ca.gov/cgi-progs/products/rescond.pdf or http://cdec.water.ca.gov/cgi-progs/reservoirs/RES/

Figure 4 shows detailed reservoir conditions at Lake Oroville, a major water supply for the state which is below average conditions but above last year's storage at this time.

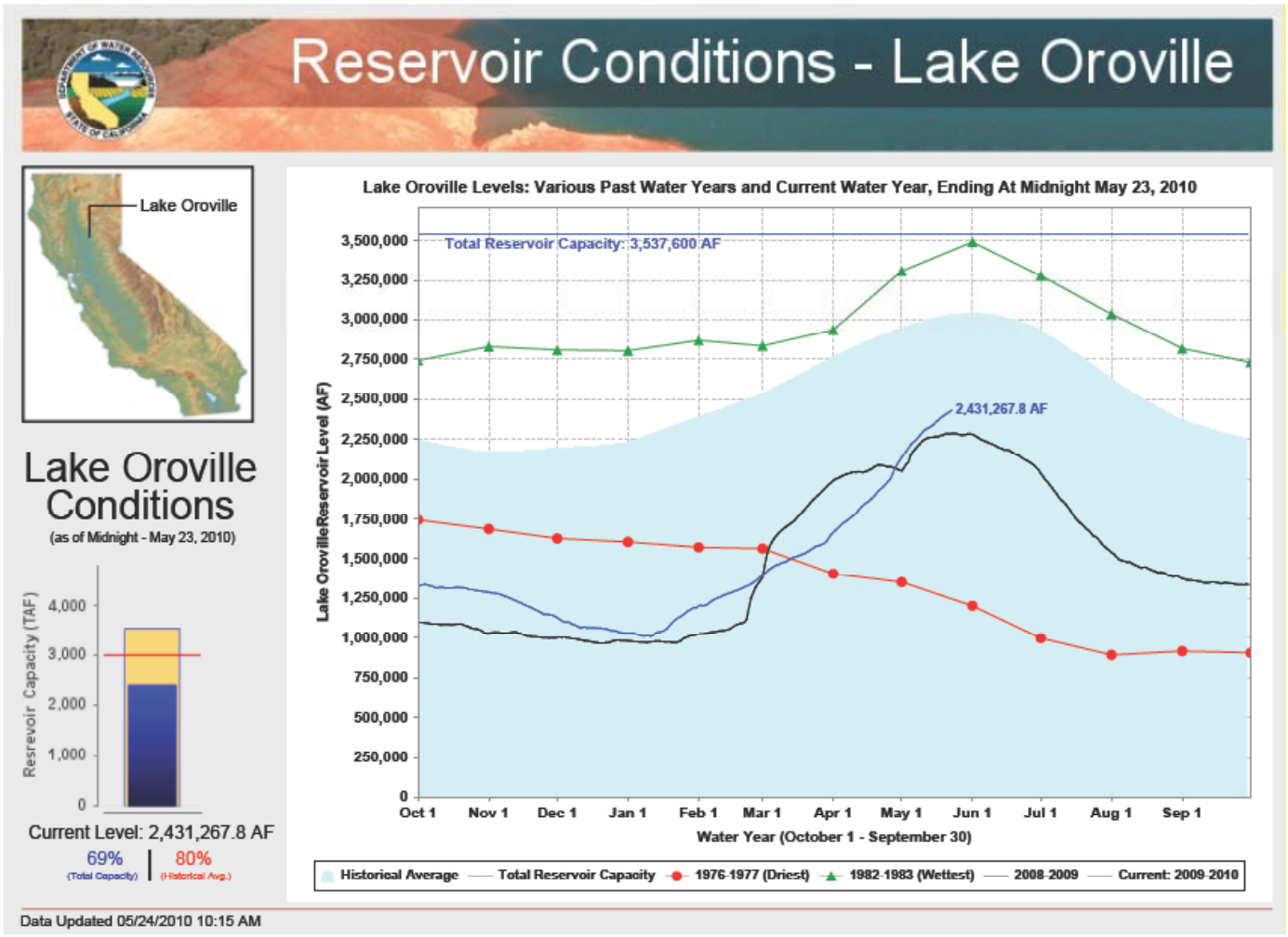

Figure 4. Detailed reservoir conditions for Lake Oroville.

Source:http://cdec.water.ca.gov/cgi-progs/products/rescond.pdf or http://cdec.water.ca.gov/cgi-progs/reservoirs/RES/

End of Water Year Key Reservoir Storage

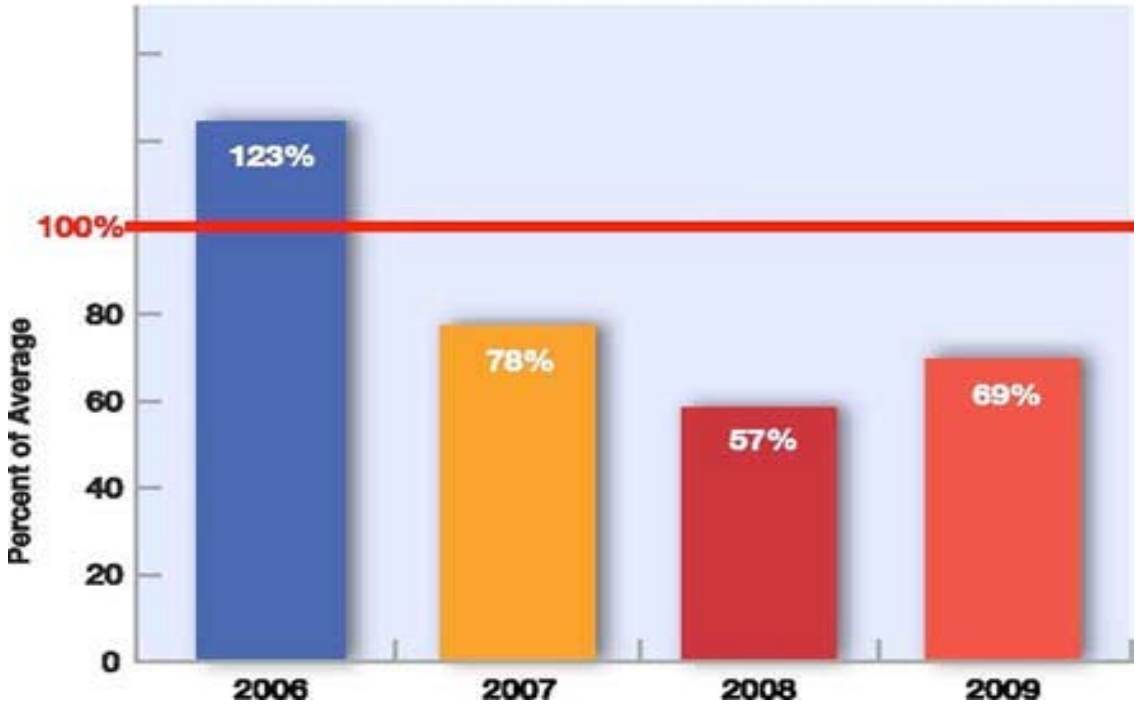

Figure 5. Percent of average end of water year storage for key reservoirs from 2006-2009. ("key reservoirs" comprise Trinity, Shasta, Oroville, Folsom, Don Pedro, New Melones, and San Luis reservoirs)

Figure 5 shows storage for key reservoirs for the end of the last four water years. The three-year drought, from 2007 to 2009, was evident in the well-below normal storage readings. The state entered the 2009-2010 Water Year with its key supply reservoirs at only 69 percent of average. However, as of May 17, 2010, the summation of storage in the "key reservoirs" improved to 94 percent of average.

Runoff

Figure 6 shows a comparison of the percent of average annual statewide runoff from Water Years 2006 through 2010 (the 2010 value includes only runoff from October through April and will be updated throughout the Water Year). Water Year 2006 was the most recent wet year in California, with 173 percent of average statewide runoff. Water Year 2007 was the first of three dry years, ending with 53 percent of average statewide runoff. Water Year 2010 stands at 75 percent of average to date (through April). Seven major Sierra rivers are flowing at rates less than 100 percent of average from May 1 through May 19.

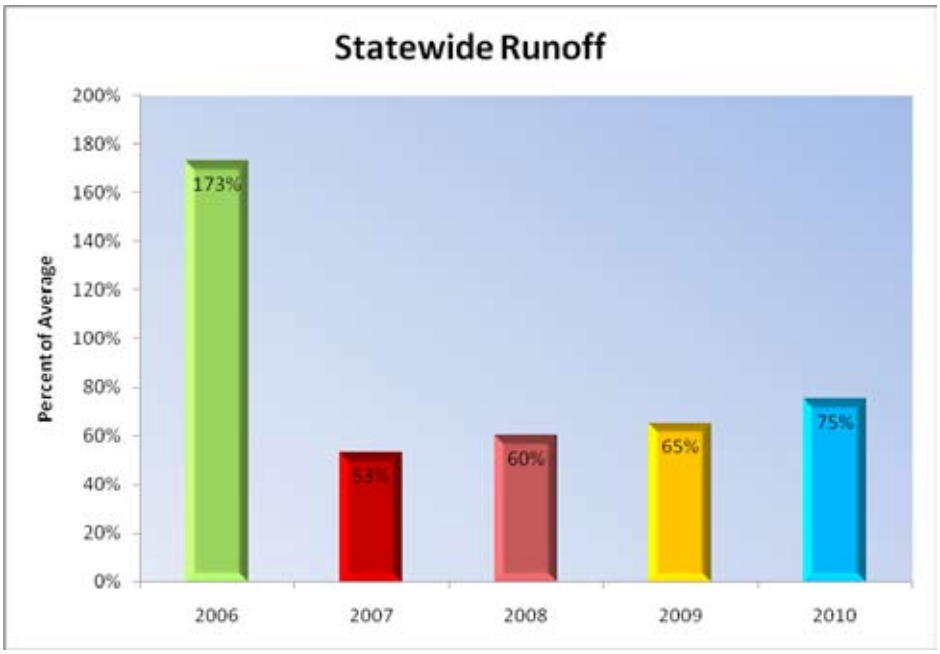

Figure 6. Statewide runoff for water years 2006, 2007, 2008, 2009 and 2010 (through April 30, 2010)

Table 2 shows the Sacramento and San Joaquin River Runoff, WSI and year type for select water years based on observed runoff. This table includes the May 1, 2010, forecasted Sacramento and San Joaquin River Runoff, WSI and Year Type.

	Sacramento River			San Joaquin River		
Water Year	Runoff MAF	Index	Year Type	Runoff MAF	Index	Year Type
2006	32.09	13.2	W	10.44	5.9	W
2007	10.28	6.2	D	2.51	2.0	C
2008	10.28	5.2	C	3.50	2.1	C
2009	12.91	5.8	D	4.97	2.7	BN
2010[1]	15.60	6.9	BN	6.20	3.5	AN

[1] May 1, 2010 forecast

Table 2. Sacramento and San Joaquin river runoff, WSI, and year type for select water years based on observed data (W=wet, D=dry, C=critical, BN=below normal)observed data (W=wet, D=dry, C=critical, BN=below normal)

The Sacramento River Unimpaired Runoff was forecasted to be 15.6 million acre-feet (MAF) on May 1, 2010. The San Joaquin River Unimpaired Runoff was forecasted to be 6.2 MAF on May 1, 2010. Both estimates are likely to remain the same or increase due to above average precipitation during May in the Sacramento River and San Joaquin River basins. The updated runoff forecasts will be posted weekly by the California Cooperative Snow Surveys section and will be available at http://cdec.water.ca.gov/cgi-progs/iodir/B120UP

Figure 7 shows the forecast of April through July unimpaired runoff as a percentage of historical average for selected Sierra river basins as of May 1, 2010. Most of the basins are forecast to have above normal runoff.

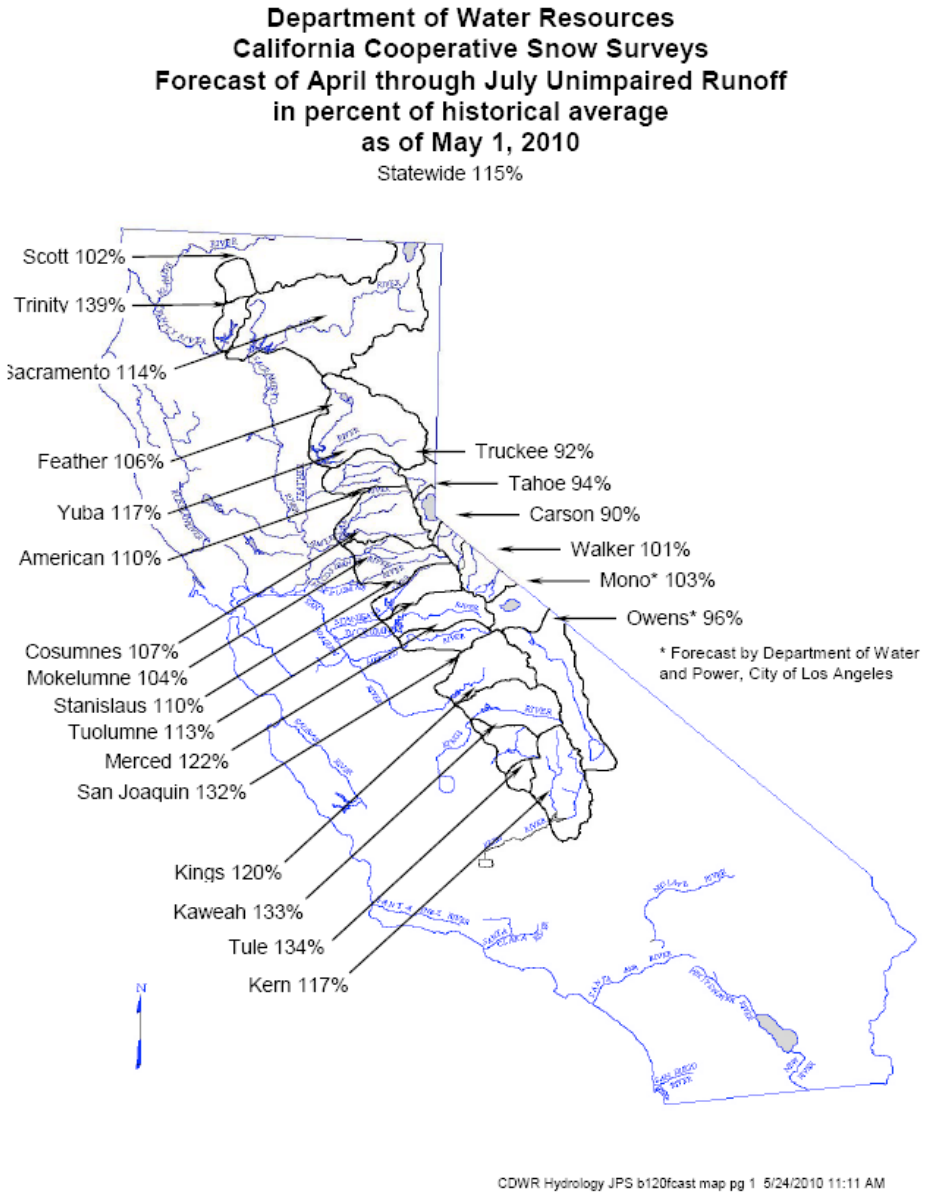

Figure 7. May 1, 2010 April through July Unimpaired runoff percentage of historical average for California.

Source: http://cdec.water.ca.gov/snow/bulletin120/b120may10.pdf

State Water Project Allocations

On May 20, 2010 the Department of Water Resources (DWR) increased anticipated 2010 State Water Project (SWP) deliveries to California's water contractors to 45 percent of requests, mainly due to late Sierra storms in April and May. The SWP allocation had been set at 20 percent of contractors' requests earlier in April and increased to 40 percent on May 4. The initial 2010 allocation estimate, made back in December 2009, was 5 percent. That projection rose incrementally as snowpack accumulated during winter and spring.

After three years of drought, low reservoir storage and fishery agency restrictions on Delta pumping continue to limit the amounts of water that can be delivered to SWP contractors serving the Bay Area, San Joaquin Valley, Central Coast and Southern California. In 2009, the SWP delivered 40 percent of the amount requested by the 29 public agencies with long-term contracts to buy SWP water. The SWP contractors deliver water to about 25 million Californians and 750,000 acres of irrigated farmland. A notice to SWP contractors appears on DWR's State Water Project Analysis Office Web site at: http://www.swpao.water.ca.gov/notices.

DWR, in partnership with the Association of California Water Agencies, will continue to run the Save Our Water program. The program, which was created by Gov. Schwarzenegger's 2009 drought declaration, aims to educate Californians about easy ways to conserve water indoors and outdoors. Visit the Web site at: http://www.saveourh2o.org.

Central Valley Project Allocations

On May 4, 2010, the Bureau of Reclamation announced an increase in the Central Valley Project (CVP) 2010 water allocation. The updated allocations are based on hydrologic conditions as they existed as of April 1, 2010, and the California Department of Water Resources (DWR) April 2010 snow survey and runoff forecast.

For CVP agricultural water service contractors north of the Delta, the water supply forecast remains at 100 percent, and the water supply forecast for Municipal and Industrial (M&I) water service contractors north of the Delta remains at 100 percent. For agricultural water service contractors south of the Delta, the water supply forecast increases from 30 percent to 40 percent, while the water supply forecast for M&I users south of the Delta remains at 75 percent allocation. The Class 2 water supply forecast for Friant Division contractors increases from 15 to 30 percent; the Class 1 water supply forecast for Friant Division contractors remains at 100 percent.

The allocations for the Eastside Division agricultural contractors (Stanislaus River), settlement contractors with claims to senior water rights along the Sacramento and San Joaquin Rivers, and Wildlife refuges allocation (Level 2 water) north and south of the Delta remain at 100 percent. The increases result from additional sources of water to boost allocations for south of the Delta agricultural water service contractors on the west side of the San Joaquin Valley and the improved storage and runoff into the CVP reservoirs.

Detailed information about the initial 2010 Central Valley Project water supply forecast, can be found at http://www.usbr.gov/mp/pa/water.

Local Impacts and Responses to the Drought

Based on the results of economic forecast models used by DWR, which used CVP deliveries announced as of May 4, 2010, and SWP deliveries announced as of May 20, 2010, as well as current assumptions about local water conditions, no shortage-related losses to irrigated agriculture are expected in the Sacramento Valley. Reduced SWP and CVP deliveries are expected to bring about job and income losses in the San Joaquin Valley in 2010, however. An estimated 6,040 to 6,152 jobs will be lost, with income losses between $426 and $434 million.

These employment and income losses include those arising from impacts on businesses in the San Joaquin Valley both directly and indirectly related to farm production. Furthermore, groundwater pumping costs are forecasted by DWR modeling to increase by an estimated $107 to $108 million as San Joaquin Valley farmers substitute groundwater for the unavailable SWP and CVP supplies.

For both the Sacramento and San Joaquin Valleys, these estimates exclude any losses associated with crop planting decisions made based on earlier much more unfavorable forecasts of SWP and CVP deliveries and assumptions about local water supply conditions. These estimates also exclude any losses associated with drought-affected dryland range and pasture, unirrigated crops, livestock operations, and dairies.

North Coast Hydrologic Region — Drought conditions in the Klamath Basin have severely impacted Klamath Project water users in both Oregon and California. On May 4, 2010, the Bureau of Reclamation's Klamath Basin Area Office released the annual Operations Plan for the Klamath Project. The Operations Plan takes into account the needs of the Endangered Species Act (ESA) listed species and tribal trust in Upper Klamath Lake, Klamath River, and Clear Lake and Gerber Reservoirs, while also meeting the needs of the downstream fishery.

Reclamation has determined that there will be sufficient water to make limited project releases from Upper Klamath Lake and Gerber Reservoir. The 2010 Operations Plan estimates 30 to 40 percent of average annual releases or approximately 150,000 acre-feet of water will be available to Upper Klamath Lake irrigators. The releases will begin once the lake level reaches a level protective of endangered suckers and is expected to remain above that level for the remainder of the irrigation season. Conditions should permit releases to begin no earlier than May 15.

Gerber Lake's forecasted inflow and carryover will allow a release of approximately 85 percent of the average annual supply or an estimated 31,000 acre-feet. Clear Lake Reservoir carryover storage and forecasted inflow indicate there will be no available water for irrigation releases in 2010. The current lake level is below the minimum level established by the U.S. Fish and Wildlife Service Biological Opinion, and any further reduction in the levels may be detrimental to the ESA-listed sucker population.

More information on the Klamath Project, including the 2010 Operations Plan can be found at http://www.usbr.gov/mp/kbao.

San Francisco Bay Hydrologic Region — Total reservoir storage continues to improve, with most reservoirs at or near capacity. The Marin Municipal Water District (MMWD) reported on May 23 that its seven reservoirs are at 100 percent capacity. MMWD continues to encourage its customers to conserve water because 75 percent of their water supply comes from reservoirs and there is uncertainty about water conditions next year. Due to lack of funding, MMWD's water conservation rebate programs have been suspended for the remainder of this fiscal year. As of May 24, storage in Santa Clara Valley Water District (SCVWD) reservoirs is at 74 percent of capacity; the SCVWD is asking everyone in the county to continue to conserve water and reduce water use by 15 percent. The East Bay Municipal Utility District (EBMUD) reservoirs are at about 88 percent full as of May 23, 2010; EBMUD customers are asked to continue to conserve their water usage. Storage in Lake Mendocino, a water supply for Sonoma County Water Agency, is above its historical average with about 104,200 acre-feet as of May 23.

Sacramento River Hydrologic Region — Water availability from Clear Lake has significantly improved for the Yolo County Flood Control and Water Conservation District; April storms filled Clear Lake allowing the District to begin irrigation season without allocations. The District reports that late spring rains caused delays in planting schedules and suppressed demand for water, but the District is pleased to operate without allotments this year. Indian Valley Reservoir is about 32 percent of capacity as of May 23, 2010.

North Lahontan Hydrologic Region — Lake Tahoe's water level has remained above its natural rim (elevation 6223 feet) since January 24 and is at 6223.93 as of May 24. The May unimpaired runoff forecast for Lake Tahoe indicates its water level will rise approximately 1 foot from late May to the summer high point, assuming the Tahoe City outlet gates are closed. While the inflow forecast is near normal at 94 percent, the lake level remains significantly lower, around 2.5 feet lower, than historical levels.

South Coast, South Lahontan, and Colorado River Hydrologic Regions — The water supply situation in Southern California has not changed significantly from that reported in the April drought update as ongoing regulatory restrictions on water deliveries from Northern California and three years of very dry conditions continue to impact the region's supply. The water storage in Metropolitan Water District's Diamond Valley Lake reservoir and the combined storage of 25 reservoirs in San Diego County Water Authority's service area increased slightly to 48 percent and 56 percent of capacity respectively, and more local agencies are emphasizing the need to continue to conserve water.

Fresno County Drought Assistance

In response to the continuing impacts of drought, Fresno County restarted its emergency food distribution program on May 19. The food distribution occurs twice a month in four cities and is expected to continue until the end of the calendar year. The Department of Social of Social Services estimates that up to 15,000 individuals are served every two weeks, or the equivalent of 30,000 individuals each month.

Summary

Cold Pacific storms in April significantly improved water supply outlook conditions with precipitation and snowpack conditions statewide well above average. The May 1 forecast for spring runoff from April through July is expected to be well above average at 115 percent statewide. The runoff forecast for the 2009-2010 Water Year is also expected to be near normal at 90 percent of average statewide. Increased runoff also helped reservoir storage conditions statewide with Lake Oroville, a major water supply reservoir for the State currently at 69 percent of average as of May 23, 2010. Below average water supply conditions still persist in the Klamath and Lake Tahoe basins. As a result of improved water supply conditions in the Sacramento and San Joaquin hydrologic regions, both the Central Valley Project and State Water Project increased their water delivery allocations in May, however allocations remain low in some major service areas south of the Delta.


Photography: DWR

The May 28, 2010 Drought Update was prepared under the direction of:
Wendy H. Martin, Statewide Drought Coordinator

Prepared by: **Douglas Osugi, Supervising Water Resources Engineer**

Credits:

Statewide Hydrologic and Water Supply Data
David Rizzardo, Senior Water Resources Engineer
David Ho, Hydrologist
Boone Lek, Senior Water Resources Engineer
Andy Reising, Water Resources Engineer
John King, Water Resources Engineer
Michael Anderson, State Climatologist
Matt Winston, Senior Meteorologist
Derick Louie, Water Resources Engineer
Tracy Pettit-Polhemus, Supervising Water Resources Engineer

Local Drought Impacts and Responses
Jim Rich, Economist
Margie Graham, Environmental Scientist
Pierre Stephens, Supervising Water Resources Engineer
Gary Lippner, Senior Water Resources Engineer
Shicha Chander, Water Resources Engineer
David Barth, Student E & A
Brian Moniz, Senior Water Resources Engineer
Abiodun Aderonmu, Water Resources Engineer
Manucher Alemi, Chief, Water Use and Efficiency Branch
Thang Nguyen, Supervising Water Resources Engineer
Simon Eching, Senior Land and Water Use Scientist

Production Services
Xiaojun Li, Graphic Services
Mark McCourt, Graphic Services
M. Elizabeth Scott, Public Affairs Information Officer